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(54) Title: TRIM ATTACHMENT SYSTEM			
(57) Abstract			
<p>Wood trim (227) is attached to the wall around a door, window, etc. by means of an extruded plastic attachment strip (216). The strip is formed with a hollow box-shaped protrusion which serves as a spline (230), which engages a complementary groove in the profile of the wood trim (227). A bar (218) formed in the back of the strip (216) profile serves to hold the strips in complementary slots (214) in the door jamb (212).</p>			

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1 Title: TRIM ATTACHMENT SYSTEM
23 This invention relates to wood trim, of the kind used to trim the edges of door frames and
4 window frames, wainscoting, and also baseboards and skirting boards, crown mouldings, etc,
5 in houses and other buildings.6 The invention is a development of the technology disclosed in PCT/GB-93/00583, published
7 30 Sept 1993 as WO-93/19273.
89
10 DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS
1112 By way of further explanation of the invention, exemplary embodiments of the invention will
13 now be described with reference to the accompanying drawings, in which:14 Fig 1 is a cross-section of a spline-strip, for use in the invention;
15 Fig 2 shows the strip of Fig 1 in an installation;
16 Fig 3 shows a mitred corner between two lengths of trim;
17 Fig 4 shows a mitred corner between two spline strips;
18 Fig 5 shows trim to which draft-excluding seals have been added;
19 Fig 6 is a cross-section of a baseboard installation;
20 Fig 7 is a pictorial view of a kit of components for a trim system;
21 Fig 8 is a cross-section of another spline-strip;
22 Fig 9 is a cross-section of another spline-strip;
23 Fig 10 is a cross-section of another spline-strip;
2425 The apparatuses shown in the accompanying drawings and described below are examples
26 which embody the invention. It should be noted that the scope of the invention is defined by
27 the accompanying claims, and not necessarily by specific features of exemplary embodiments.
2829 Fig 1 shows a trim attachment strip 150, which is formed as a plastic extrusion. Fig 2 shows
30 the strip of Fig 1 in use to attach a piece of wood trim to a wall, associated with a door
31 opening.
3233 The profile of the strip 150 includes a base or web 152, which lies flat against the wall. (The
34 web may be bowed slightly, in profile, so that when the strip is nailed flat to the wall the
35 edges of the profile are pressed against the wall.) Protruding outwards from the web 152 is a
36 spline 154. The spline 154 has the form of a hollow rectangular box, comprising left and right
37 side walls 156 and a roof 158.
3839 The roof 158 is slightly dished or curved, as shown. At the outer corners of the junction
40 between walls and the roof, the profile includes a small, radiused promontory 160. By virtue
41 of the promontories 160, the spline 154 is slightly thicker at its outer end, or roof end.
42

1 Protruding inwards (with respect to the wall) from the back of the spline-strip 150 is a
2 protrusion or bar 163. This protrusion is ridged, as shown in Fig 1.

3 Protruding outwards from the front of the spline-strip 150 is an inclined rib 165. The rib 165
4 protrudes not at right angles, but at the slight angular inclination as shown in Fig 1.

5 Fig 2 shows the spline-strip 150 installed. The ridged protrusion 163 engages a groove 167
6 cut in and along the length of the edge of the (wood) door-jamb-piece 169. By this
7 engagement, the spline-strip 150 and the jamb-piece 169 are locked together against relative
8 lateral movement.

9 As shown in Fig 2, the door-jamb-piece 169 is secured in place relative to the door opening
10 by virtue of the fact that the spline-strip 150 is secured to the wall stud 170 by means of
11 screws 172. (Nails, staples, etc, may be used to secure the spline-strip.) The exact position
12 and orientation of the jamb-piece 169 in the opening can be adjusted by adjusting the exact
13 place in which the spline-strip is fixed to the stud.

14 The jamb-piece as illustrated in Fig 2 is located at the door-hinge-side of the opening, and it
15 will be understood that the corresponding jamb-piece at the door-open-side of the opening is
16 secured in a similar manner. Also, the jamb-piece of the lintel of the opening is secured in
17 similar manner.

18 The spline-strip 150, arranged and used as described, provides for a very simple installation of
19 the door-jamb-pieces and the lengths of trim around the door, even though the installer may
20 not be a skilled craftsman. The arrangement as described enables the installation to be done
21 in a manner that make it easy to ensure that the mitred corners of the finishing wood trim will
22 be exactly square and even.

23 Usually, a door opening is not exactly square and even. The installer may temporarily secure
24 the lintel jamb-piece and spline-strip, and then, with the aid of a set square or jig, align the
25 hinge-side and the open side-jamb pieces and spline-strips. He may install both the inside-
26 the-room and the outside-the-room strips at the same time. Generally, the installer will find
27 that he can easily set the lintel piece first, and then can set the two side pieces exactly at right
28 angles to the lintel piece.

29 In Fig 2, it will be noted that no shims are required between jamb-piece and stud in order to
30 hold the jamb-pieces in their correct location in the opening. The jamb-pieces are fully
31 located and constrained by the spline-strips, and by the screws 172. The space 174 is made
32 large enough to accommodate such out of squareness and other unevenness as may be
33 required, to ensure that the jamb-pieces and the spline-strips can be put in place exactly at
34 right angles to each other.

35 The spline-strip 150 is secured to the wall stud 170 by means of the screws 172. The
36 screws 172 are shown in Fig 2 as being driven through the spline-strip 150 and into the
37 wall stud 170. The screws 172 are shown as being driven through the spline-strip 150 and into
38 the wall stud 170. The screws 172 are shown as being driven through the spline-strip 150 and into
39 the wall stud 170. The screws 172 are shown as being driven through the spline-strip 150 and into
40 the wall stud 170. The screws 172 are shown as being driven through the spline-strip 150 and into
41 the wall stud 170.

1 The jamb-pieces 169, spline-strips 150, and the lengths of trim 176, may be pre-made in-
2 factory. The purchaser states the size of the door, and is supplied with the appropriately-sized
3 kit; all the items in the kit are pre-cut to size and all mitres are pre-cut on accurate factory
4 machinery. A kit may be made up of pre-cut and pre-mitred spline-strips; also, pre-cut and
5 pre-mitred lengths of trim (which are not only pre-cut and pre-mitred, but are also fully and
6 finally finished); and also, fully and finally finished jamb-pieces. Since doors come in a limited
7 number of standard sizes, it is economical for wood trim shops to hold stocks of the pre-cut
8 trim, spline-strip, and jamb-pieces in kits for the various standard sizes of door.

9 The pre-made trim kits provide even the amateur carpenter with a simple way of ensuring that
10 all mitres are not only cut perfectly, but are installed at an accurate right angle. This is in
11 addition to the other benefits of the system: (a) the fact that no nails etc are used to secure
12 the trim means that the trim may be made with a factory-applied finish; and (b) the trim is
13 removable and can be removed and replaced to simplify the task of wall-papering, painting,
14 etc.

16 In some cases, the installer might wish to remove a sliver of material from the edge of a jamb-
17 piece 169, for example to make the edge lie flush with the wall surface. The grooves 167
18 should be made deep enough to allow for some material to be removed from the jamb-piece,
19 and still leave the groove deep enough that the ridged protrusion 163 does not bottom in the
20 groove.

22 The profile of the wood trim 176 may be provided with a space to receive electrical wires
23 running inside the trim. Such wires may be held in place with special clips, which hook into
24 holes drilled in the web of the spline-strip. Alternatively, wires can be secured simply by
25 passing a staple around the wire and through the web.

27 The trim 176 is provided with a spline-groove 178 and a rib-groove 180. To install the trim to
28 the spline-strip 150, the length of trim is first assembled over the leaning rib 165; the rib 165
29 bends slightly when the trim is pressed down over the spline 154, resulting in a (slightly)
30 heavier contact force between the rib 165 and the trim 176, and a force which tends to draw
31 the edge of the trim into a slightly tighter contact with the jamb-piece.

33 The spline-groove 178 and the spline 154 have a slight interference fit, especially over the
34 roof-end of the spline, where, as mentioned, the spline is slightly thicker because of the corner
35 promontories 180. The roof 158 is able to bend (in a buckling mode), to the extent required
36 for the spline 154 to fit in the groove 178 with a good contact force.

38 The hollow-box form of the spline 154 profile is excellent in providing just the right balance
39 between stiffness and resilience in the spline.

41 It may be noted that if the spline were solid, only a very limited degree of interference
42 between the spline and the spline-groove could then be allowed -- typically about 0.01 mm
43

1 maximum. The designer dare not provide more interference than that, or the spline-groove
2 178 in the trim may tend to crack open.

3
4 The solid-spline system as described in earlier publications is able to provide excellent
5 retaining and holding power of the trim to the spline, even though the spline has only a light
6 interference, hardly any interference, or no interference at all, with the spline-groove.
7 However, when the spline is made of plastic, in the form of an extrusion in PVC, for example,
8 the coefficient of friction between the PVC of the spline and the wood of the spline-groove can
9 be low enough that the designer wishes to resort to interference to provide the holding power
10 needed.

11
12 Heavy interference could not be contemplated when the spline was solid. A solid spline has
13 too little resilience, and if the interference is just slightly too much, the wood trim will crack.
14 On the other hand, if the "spline" were to take the form of two protruding arms, side by side,
15 and cantilevered out from the web, the resilience of such cantilevered arms would then be too
16 much: it would not in that case be possible to develop enough contact force between such
17 arms and the sides of the spline-groove to give enough holding power.

18
19 It may be regarded that in the hollow-box profile of the spline the roof 158 serves to hold the
20 outer ends of the left and right walls 156 apart. The roof 158 is resilient enough, in the
21 bending/ buckling mode, to allow the walls to bend inwards slightly, if the groove should be
22 cut narrow, and yet enough interference is provided to ensure good holding power if the
23 groove should be cut on the wide end of its permitted tolerance range. This just-right degree
24 or rate of resilience of the spline is enhanced if the roof 158 is given the nominal curvature, as
25 shown.

26
27 The thickness of the roof can be adjusted, also, to provide just the right degree of resilience: it
28 has been found that making the roof slightly thinner than the walls can help give the right
29 balance between a too-hard spline, which has no "give" and splits the wood trim if the groove
30 is slightly too tight, and a too-soft spline, in which the spline does not provide enough grip to
31 the sides of the groove. The hollow-box design of spline enables the spline to grip the trim
32 tightly enough for good securement, over a tolerated range of groove widths.

33
34 The degree of resilience attributable to the hollow-box profile of the (plastic) spline may be
35 expected to provide holding power over a tolerance range of the order of 0.02 mm.

36
37 The hollow-box profile allows a greater dimensional magnitude of interference between spline
38 and spline-groove than was the case with the solid spline. In the context of plastic splines:-
39 on the one hand, a solid plastic spline has hardly enough resilience to permit any
40 interference; on the other hand, two cantilevered arms would have too much resilience. But
41 two cantilevered arms joined by a roof (which is what the hollow-box profile amounts to) has
42 just the right degree of resilience to provide a good holding force without demanding difficult-
43 to-manufacture tolerances. Interference-fits generally require tight tolerances: the hollow-box

1 profile for the plastic spline eases that requirement enough that a factory-cut groove in a
2 length of solid oak or other wood trim can be accurate enough.

3
4 A problem that can sometimes arise with mitred corners is that the wall is not quite flat in the
5 plane of the wall. As a result, at a mitred corner, the horizontal lintel trim might protrude
6 perhaps a half-millimetre further out from the wall than the vertical trim. Even though the mitre
7 might be exactly a right angle, such protrusion-mismatch can be quite noticeable.

8
9 Fig 3 shows how the lengths of trim may be joined together at the mitred corners, in a way
10 that eliminates protrusion-mismatch. The mitred edge 183 of the vertical length of trim 185,
11 and the corresponding mitred edge of the horizontal length of trim 186, are provided with slots
12 187, into which is inserted a biscuit 189. The biscuit 189, conventionally, is a piece of
13 hardwood or plastic sheet formed to the oval shape as shown. The biscuits may be glued in
14 place, or, if the trim profile is of appropriate thickness, the biscuits may be screwed in place,
15 as at 190. Of course, the screws are screwed in from the back of the trim, and must be short
16 enough not to extend right through the trim.

17
18 In Fig 3, the trim lengths 185,186 are secured together before being placed on the wall. This
19 means that the installer must be able to rely on the accuracy of the mitres, as cut, in both the
20 trim lengths and the spline-strips. It will be understood that securing the trim-lengths together
21 with biscuits, and then placing the secured-together trim-lengths on the spline-strips, poses a
22 very demanding requirement for accuracy of the mitres and of the dimensions of the pieces.
23 However, such accuracy is available if the mitred joints between the trim lengths and the
24 spline strips are factory-made to suit the particular door size. The pre-grooved door-jamb-
25 pieces 169 should be included also in the same kit.

26
27 It is recognised that the in-factory-accuracy of making the mitred joints in this way is not
28 wasted nor compromised, even if the door opening is (as they usually are) not truly accurate
29 and square.

30
31 It is convenient to join the lintel trim-length to the two vertical trim-lengths, by means of the
32 biscuit connectors, just before the sub-assembly comprising the three trim-lengths is applied
33 to the already-installed spline-strips. The sub-assembly of the three trim-lengths is awkward,
34 and vulnerable to transit damage; however, a professional trim installer may be willing to take
35 the trouble to handle the vulnerable assembly with the needed care, in exchange for the
36 benefits of pre-making and pre-gluing the biscuit connectors in-factory.

37
38 Pre-making the sub-assembly of the trim-lengths by pre-gluing biscuit connectors into the
39 joints is much more efficacious in the case of window trim. With window trim, there are four
40 lengths of trim, in the form of an enclosed rectangle. A window trim sub-assembly, being an
41 enclosed rectangle, is much more robust than a door trim sub-assembly, and can be
42 expected to survive handling by amateur craftsmen. However, it will be appreciated that the
43 need for accurate cutting of the lengths and of the mitre angles is very pressing when the trim

1 is installed as a sub-assembly onto the already-installed spline-strips; such pre-making of the
2 sub-assembly is only possible when the pieces are supplied together, in a kit, having been
3 made on accurate machinery.

4 In fact, if there is protrusion-mismatch of the trim-lengths at a mitred joint because the wall
5 surface is not quite flat, the two spline-strips making up the joint also may be expected to
6 have the mismatch. Indeed, in some cases, if the mismatch of the spline-strips is eliminated,
7 there will be no need to cater for mismatch in the trim itself. Certainly, the installation and
8 attachment of the trim lengths (and the possible detachment of the trim-lengths at some future
9 time) is much more convenient if the trim-lengths are not permanently glued together as a pre-
10 made sub-assembly.

11 Catering for possible protrusion-mismatch between mitred spline-strips is very simple, in view
12 of the hollow-box profile of the spline-strip. As shown in Fig 4, injection-moulded plastic
13 corner-pieces 192, having a rectangular form which fits the hollow interior of the spline 154,
14 are inserted into the splines at the mitred corners. When the spline-strips 150 are screwed or
15 nailed to the wall, the corner-pieces 192 constrain and hold the two spline-strips at the same
16 protrusion level, even if the wall should be (slightly) uneven.

17 The corner-pieces 192 may serve in this way equally for door trim as for window trim.

18 More than one spline or rib may be provided on the strip, having also a hollow interior, and
19 corresponding corner pieces may be provided for that also.

20 A preferred way of installing the trim and its mounting system may be described as follows.
21 The lengths of trim, the spline-strips, and the door-jamb-pieces, are all, pre-mitred, and pre-
22 finished, in-factory, and are purchased by the installer as a kit for a particular width of door, or
23 door opening. The kit is opened in the room, and the door-jamb-pieces are assembled, on
24 edge, on the floor. The spline-strips for the inside of the room are assembled to the door-
25 jamb pieces; the ribbed protrusions 163 are entered into the groove 167 while the jamb-pieces
26 are still laid on the floor.

27 The door-jamb pieces may now be secured together at the mitred corners, using appropriate
28 fasteners. (Of course, these fasteners should be so arranged as not to be visible after
29 installation.)

30 The assembly comprising the fixed-at-the-corners jamb-pieces and the inside-the-room spline-
31 strips, which are already assembled to the jamb-pieces, may now be lifted off the floor of the
32 room, and the assembly placed in the door opening. The installer will generally be able to
33 tell, by eye, by looking at the mitred corners, both of the jamb-pieces and of the spline-strips,
34 whether the corners are accurately at right angles. It may be regarded that if the installer
35 cannot see any out-of-squareness at the corner by looking at the line of the mitre, then the
36 out-of-squareness is so small it can be ignored. Set squares and other instruments are

1 generally not required. The installer must be able to "trust" the mitres for squareness, but this
2 is acceptable with factory-made mitres.

3 The spline-strips are secured to the wall when the installer is satisfied, looking at the lines of
4 the mitres, that the corners are square. The door jamb-pieces are secured by securing the
5 spline-strips to the wall. Once the inside-the-room spline-strips are secured, the outside-the-
6 room spline-strips may be installed, using the grooves 167 cut in the far edges of the jamb-
7 pieces. The outside-the-room spline strips are secured to the wall also.
8

9 The jamb-pieces and the spline-strips having been installed with accurately-square corners, in
10 this manner, the lengths of wood trim may now be assembled to the splines. The installer
11 may be confident that the mitred corners of the wood trim will look square (and indeed will be
12 square), provided the installer took a little trouble to ensure the mitred corners of the spline-
13 strips looked square, by looking at the mitre-line.
14

15 When installing the spline-strips and the wood trim in a case of renovation, rather than original
16 installation, it will generally be impractical for the jamb-pieces to be provided with grooves
17 167. For renovation work, therefore, the spline-strip is provided without the protrusion 163.
18 Also, for window trim, the protrusions 163 will not be present.
19

20 Even though, for renovation, there is no protrusion-in-groove engagement between the jamb-
21 pieces and the spline-strips, out-of-squareness of the door jamb can be accommodated
22 (within limits) simply by the placement of the spline-strips. For renovation, the installer relies
23 on looking at the line of the mitre to indicate when the spline-strips are square; he does not
24 rely on the alignment of the strips with the existing door (or window) jamb. The installer looks
25 at the line of the mitre (a distance of about 8.5 cm if the spline-strips are 6 cm wide) and
26 makes sure the mitre line appears to be the same thickness all along its length. With only a
27 minimal skill, the installer can fix the spline-trim with its corners square enough that the
28 corners in the finished wood trim, when the wood trim comes to be pressed onto the splines,
29 appear to be perfectly aligned.
30

31 Fig 5 shows a useful variation to the trim, in which further grooves 196 are provided in the cut-
32 profile of the trim. Rubber sealing strips 198 are carried in the grooves 196, and serve to
33 prevent drafts which may be emanating from inside the (hollow) wall and from the space 174,
34 from leaking around the trim.
35

36 Fig 6 shows another manner in which the invention may be applied: for wide trim, such as
37 may be required for a baseboard, the trim may be provided in, for example, three sections.
38 The outer two sections 200,201 are attached by means of the spline attachment system of the
39 invention, whereas the middle section 203 is screwed in place. Normally, the screws holding
40 the middle section remain concealed by the outer two sections. When decorating the room,
41 the outer two sections, being spline-held, can be removed. A similar arrangement may be
42 employed also for crown moulding trim.
43

1
2 Fig 7 shows a kit of components, as may be used for securing trim around a door, when the
3 application is of such a kind that the door jamb can be made specially to suit the trim system.
4 It can be arranged, in that case, in particular, that the door jamb pieces 210,212 may be
5 provided with slots or grooves 214 along their edges (similar to Fig 2). The spline-strips 216
6 are provided with integral barbed or ridged bars 218, which engage the groove.

7
8 Bearing in mind that the spline-strips 216 are present on both sides of the door, such a fixing
9 system is extraordinarily strong, even though the bars 218 are simply pressed into the grooves
10 214. The door jamb pieces 210,212 need not in fact be screwed to the door frame at all,
11 themselves, but can be held in place entirely by means of the spline-strips 216. (The spline
12 strips of course are nailed or stapled, through the plasterboard, to the door frame in the wall.)
13 The carpenter may attach the door hinges, latch, etc, to the jamb pieces with full confidence
14 that even if the door were to be slammed hard the jamb is rigidly secured. Also, the jamb-
15 pieces may be pre-finished, in-factory, since no through-fasteners (which might damage the
16 finish) are required to hold them in place.

17
18 In some installations, the width of the wall is not quite the same as the width of the jamb-piece
19 210,212, or the wall may be slightly bowed. Mis-match due to thickness variations or lack of
20 straightness can easily be accommodated (within limits, of course) by the spline-strips 216,
21 which are fairly flexible in the plane of the wall, and yet still the jamb-pieces are held very
22 firmly in place relative to the wall, by virtue of the securement of the spline strips to the wall.

23
24 The bars 218, being barbed, remain firmly secured to the jamb-pieces, once assembled
25 therein. The force on the groove 214 is considerable, but the jamb-piece (much more so than
26 the trim) is thick and chunky, and is not prone to cracking due to the heavy forces. Although
27 the wood trim can be removed from the spline-strips by hand manipulation, the barbed bars
28 218 are a barely-removable fit in the grooves 214.

29
30 The kit of components of Fig 7 includes corner pieces 220 of the spline-strip. To form these
31 corner pieces, two pieces of the plastic spline-strip extrusion are cut off at (exactly) 45
32 degrees. The two pieces are welded together at (again exactly) 45 degrees. These
33 manufacturing processes can be carried out in-factory, where the required degree of accuracy
34 is easy to obtain.

35
36 To assemble the kit of components, first the corner-pieces 220 are pressed into the horizontal
37 and vertical jamb-pieces 210,212. This is done on both sides of the wall, ie inside and
38 outside the room. (The wood trim is absent at this time.) Next, the corner-pieces are
39 attached to the wall, by screwing, stapling, etc. With the corner-pieces of the spline-strip
40 secured to the jamb-pieces, it is ensured that the intersections of the jamb-pieces are
41 accurately at right angles, simply by fixing the corner-pieces of the spline-strip to the wall
42 while the corner-pieces are assembled to the jamb-pieces. Both the inside and outside
43 corner-pieces are secured at this time.

1 Next, the horizontal and vertical fill-in pieces 223,225 of the spline-strip are cut to length, their
2 barbed bars 218 pressed into the grooves 214 in the jamb-pieces. The fill-in pieces are fixed
3 to the wall, again both inside and out. No particular care and skill is needed to align the fill-in
4 pieces of spline-strip with the jamb-pieces. Each is constrained by the other to adopt the
5 correct position, without the need for measurements, or marking out, etc, by the carpenter.
6

7 The jamb-pieces 210,212 are secured to the spline-strips 216 over their whole lengths, which
8 is why the securement of the jamb-pieces is so firm and rigid. In other installations, when
9 door shims are used for example, jamb-pieces are secured at only perhaps two or three
10 points along their lengths.
11

12 Finally, the trim 227 (Fig 8) is pounded on. In the kit, the horizontal piece of trim is pre-cut, in
13 the factory, to match the nominal door size; that is to say, to match exactly the width of the
14 horizontal jamb-piece 210. The vertical pieces of trim may be arranged to be cut to the
15 correct height by the carpenter, the mitred corners of the vertical of trim being done in the
16 factory.
17

18 The fixing of the spline-strip 216 is done by inserting screws into the spline 230 itself – the
19 spline being hollow, the screws go through clearance holes in the roof 232 of the spline, and
20 abut the floor 234 of the spline. Staples (or screws, or nails, or other suitable fasteners) may
21 be inserted through the main flat area 236 of the spline-strip, into the wall.
22

23 The use of the pre-made corner-pieces 220 makes it substantially less demanding to arrange
24 that the of trim, when assembled, fit exactly together. The arms of the corner 220 are long
25 enough to ensure the pieces of trim are forced to be correctly aligned to the corner-pieces.
26

27 In Fig 8, the spline 230 itself has the bowed and slightly thinned roof 232, as previously
28 described. The side walls 238 of the hollow spline are plain, and may be straight (parallel) or
29 may have a slight draft angle.
30

31 In Fig 8, the rib 240 is curved. The curved rib 240 interacts with the profile 243 of the trim
32 piece in such a way that the rib presses forcefully against the side 245 of a groove 247 cut in
33 the trim. The friction arising from this forceful contact holds the inner end 249 of the trim tight
34 against the wall. (If only the main spline 230 were provided, i.e if the rib 240 were not
35 present, the inner end 249 of the trim might tend to lift.)
36

37 In the case of the installation of wood trim to pre-existing buildings, the following points may
38 be noted. Although the grooves in the jamb-pieces can be readily provided in new
39 installations, it is, in general, not possible to provide grooves in the jamb pieces if the jamb
40 pieces are already in existence in the building.
41

42 Thus, for home-improvement installations, there are no grooves on the jambs, and no barbed
43

1 ribs or bars on the profile of the spline-strip 216' (Fig 9). Still, the pre-made corners may be
2 used with advantage.

3 First, the carpenter cuts the horizontal trim-piece with mitred ends, suitably to fit the door size.
4 (Or, lumber stores may stock already-mitred-both-ends pieces of trim to suit standard door
5 widths.) The carpenter assembles the two corner pieces to the horizontal trim piece, and
6 presents those components in place on the wall, and marks the wall. He removes the corner
7 pieces from the trim, and then nails the corner-pieces to the wall, in the positions as marked.
8 A horizontal fill-in piece of spline-strip may be cut slightly shorter than the space left between
9 the corners-pieces, and this fill-in piece now in turn is pressed into the horizontal trim; the trim
10 is then assembled lightly to the already fixed corner, and marks are made on the wall for the
11 line of the fill-in piece. The trim is removed, and the fill-in piece nailed to the marks on the
12 wall.

13 The carpenter can place the vertical of spline-strip similarly accurately. With all the spline-
14 strips all in place, finally the trim can be pounded on.

15 For home-improvement installations, more care is needed for marking and placement of the
16 spline-strips than when the spline-strips were located in the grooves in the jamb-pieces. But
17 still, the amount of care and attention with marking and placement, needed to make the trim
18 appear neat (and especially for the mitred corners to fit accurately) is much less than with
19 many conventional installation systems.

20 In the version of the profile shown in Fig 10, the rib 240' is arranged to face the other way, i.e
21 to touch the other side of the groove of the trim. Now, the pressure between the rib 240' and
22 the side of the groove 247 drives the profile of the plastic spline-strip into tension and the
23 profile of the wood trim into compression, an arrangement that may be preferred in some
24 cases.

25 It is emphasised that the above-described trim fixing systems are particularly suitable when
26 the trim is of solid wood of the kind used for decorative trims, e.g oak. It is a demanding task
27 to secure solid wood trim, because the wood has a tendency to split at the corners of
28 grooves. Therefore, the splines cannot be too tight a fit in the grooves: as explained, it is only
29 when the splines and the grooves engage each other over their whole lengths that a nominally
30 loose fit is found to be tight enough to hold the trim in place.

31 It may be noted that extruded plastic can change dimensions by as much as 2-3% with
32 changes in humidity and temperature. Obviously, the householder does not want the trim to
33 fall off in the winter, and by engineering the fit to obtain over the width of a relatively thin (e.g
34 1 cm) spline, such percentage dimensional changes have insignificant effect on the fit. If the
35 fit were between two surfaces that were, say, 5 cm apart, instead of 1 cm apart, the change of
36 dimensions might easily lead to trim fall-off problems.

1 The problem of the trim being liable to split is not confined to solid wood trim: increasingly,
2 thick trims are being manufactured by wrapping a sheet of veneer over consolidated sawdust,
3 or over cheap softwood, or other composites, and these can tend to split even more than
4 solid wood. It may be noted that thin trims, even in solid wood, being flexible, can actually be
5 less likely to split. Plastic trim, i.e solid plastic, does not tend to split, so it is easy to arrange
6 that plastic trim is held in place very firmly by engagement with a backing strip. But thick,
7 solid wood trim (or veneered sawdust trim) is still considered far more attractive than plastic –
8 provided it can be held in place.

9 When fitting trim around a window, four mitred corners have to be aligned, and means may
10 be provided for permitting all four corners to be made truly square. First, the upper horizontal
11 spline-strip is secured in place, and then the two vertical spline-strips are secured, one at
12 each end. It is a simple matter to make these two corners square, because the trim pieces
13 may be used as templates for marking and fixing the spline-strips. Next, the lower horizontal
14 spline-strip is put in place, but now the trim piece cannot be used as a template for squaring
15 the final corner of the spline strip, because the trim masks the spline-strip. The spline-strips
16 should be provided with slotted holes in the region of the final corner, via which the spline-
17 strips may be secured temporarily, such securement being such that the spline-strips may be
18 knocked finally into place by gradual reduction of any out-of-squareness mismatch.
19

20 In another arrangement of door trim, the welded-angle corner-assemblies (cf 220, Fig 7) may
21 be arranged differently. The vertical arm of the assembly may be made as long as the door
22 height, i.e 2 metres or thereabouts. The short arm may be approximately 20 cm long. As
23 such, the corner assembly is a little more vulnerable to being damaged during handling and
24 installation, but not much: the benefit is a considerable simplification of the task of fitting the
25 trim around the door. Often, no horizontal fill-in piece (cf 223) is required. Of course, in that
26 case, a left-side corner is different from a right-side corner, and both must be stocked and
27 purchased.
28

Claims

1 **CLAIM 1.** Wood trim apparatus, which includes a trim-mounting spline-strip for attaching the
2 wood trim to a wall, around doors and windows, baseboards, corner mouldings, or
3 the like, wherein:
4 the spline-strip is of plastic, and is elongate, and comprises a unitary structure having the
5 same cross-sectional profile at all points along its length;
6 the cross-sectional profile includes a base or web, which is adapted for direct application to a
7 flat surface of a wall;
8 the cross-sectional profile includes a spline which, when the spline-strip is applied to a wall,
9 protrudes from the wall;
10 the spline includes left and right side wall components, and a roof component;
11 and the components of the spline are arranged to form a hollow box-shaped enclosure.

1 **CLAIM 2.** Apparatus of claim 1, wherein the roof of the hollow spline is slightly curved or
2 dished inwards.

1 **CLAIM 3.** Apparatus of claim 2, wherein the outer walls of the hollow spline are provided
2 with small, radiused, promontories.

1 **CLAIM 4.** Apparatus of claim 2, wherein the spline-strip includes a protruding rib, which,
2 when the spline-strip is applied to a wall, protrudes from the wall;
3 the protruding rib is resilient in the direction defined by the plane of the cross-section and the
4 plane of the wall.

1 **CLAIM 5.** Apparatus of claim 1, wherein the spline-strip includes a protruding bar, which,
2 when the spline-strip is applied to a wall, protrudes inwards, into the plane of the wall.

1 **CLAIM 6.** Apparatus of claim 4, wherein the spline-strip includes a protruding bar, which,
2 when the spline-strip is applied to a wall, protrudes inwards, into the plane of the wall,
3 and wherein, in cross-sectional profile of the spline-strip, the hollow spline lies towards
4 one end of the base or web, the bar lies towards the other end of the base or web,
5 and the rib lies intermediate therebetween and closer to the bar than to the spline.

1 **CLAIM 7.** Apparatus of claim 1 wherein:
2 the wood trim is a unitary structure having the same cross-sectional profile along its length;
3 the cross-sectional profile of the trim includes a groove, and the groove is sized to be a light
4 fit on the spline.

1 **CLAIM 8.** Apparatus of claim 7, wherein:
2 the spline strip includes a protruding rib, which, when the spline-strip is applied to a wall,
3 protrudes from the wall;
4 the protruding rib is lightly and resiliently deformable in the direction defined by the plane of
5 the cross-section and the plane of the wall;

6 the profile of the trim includes a face which is so arranged that, when the trim is assembled to
7 the spline-strip, the face is resiliently engaged by the protruding rib in the said
8 direction;
9 the arrangement of the rib and the face are such that the friction created by the engagement
10 therebetween acts to resist the trim being dislodged from the spline-strip.

1 CLAIM 9. Apparatus of claim 8, wherein the resilience of the rib and the orientation of the face
2 are so disposed as to stress the profile of the trim in tension and the profile of the
3 spline-strip in compression.

1 CLAIM 10. Apparatus of claim 8, wherein the resilience of the rib and the orientation of the face
2 are so disposed as to stress the profile of the trim in compression and the profile
3 of the spline-strip in tension.

1 CLAIM 11. Apparatus of claim 7, wherein the apparatus includes vertical-lying and horizontal-
2 lying lengths of the said trim, and corresponding lengths of the spline-strips, the
3 lengths being all pre-cut and pre-mitred, and accurately matched.

1 CLAIM 12. Apparatus of claim 11, wherein the vertical-lying and horizontal-lying lengths of
2 trim are pre-formed into a sub-assembly of matching pieces.

1 CLAIM 13. Apparatus of claim 12, wherein the sub-assembly of horizontal-lying and vertical-
2 lying lengths forms an enclosed rectangle, the combination being suitable for
3 installation around a window.

1 CLAIM 14. Apparatus of claim 12, wherein the apparatus includes also corresponding door-
2 jamb-pieces, all pre-cut and accurately matched;
3 the jamb-pieces are provided with grooves along the edges thereof;
4 and the spline-strips are provided with bars, located on the back of the web, which engage
5 the grooves in the edges of the jamb-pieces.

1 CLAIM 15. Apparatus which includes two of the spline-strips as claimed in claim 1, and a
2 corner piece;
3 the corner piece is profiled to fit snugly inside the hollow interiors of the spines of the spline-
4 strips, and is so shaped that, when placed in the hollow interiors of the two spline-
5 strips arranged in a 90-degree mitred corner, the corner-piece is effective to hold and
6 constrain the spline-strips in the said mitred corner against relative movement.

1 CLAIM 16. Apparatus which comprises two of the spline-strips as claimed in claim 1, wherein
2 the two spline-strips are welded together into a corner assembly, having the form of a
3 90-degree mitred corner.

1 CLAIM 17. Apparatus which comprises two of the said welded corner assemblies of the

2 spline-strip of claim 16, having short arms, the arms having square ends;
3 one horizontal-lying length of the spline-strip of claim 1, cut square both ends;
4 two vertical-lying lengths of the spline-strip of claim 1, cut square both ends;
5 one horizontal-lying length of trim, being trim of a unitary structure having the same cross-
6 sectional profile along its length, wherein the cross-sectional profile of the trim
7 includes a groove, and the groove is sized to be a light fit on the spline;
8 and two vertical-lying lengths of the said trim, each mitred one end.

1 **CLAIM 18.** Apparatus which comprises two of the kits as claimed in claim 17, being an inside
2 kit and an outside kit, wherein:
3 the assembly includes a horizontal-lying and two vertical-lying door-jamb-pieces;
4 the jamb-pieces are provided with grooves along the edges thereof;
5 the spline-strips in the kits are provided with bars, located on the back of the web, which
6 engage the grooves in the edges of the jamb-pieces;
7 the arrangement of the assembly is such that, upon application thereof to a doorframe in a
8 wall, and upon securement of the splines to the wall, the door-jamb-pieces, in the
9 absence of direct fixing of the door-jamb-pieces to the doorframe, are held rigidly with
10 respect to the wall.

1 **CLAIM 19.** Apparatus of claim 12, wherein the horizontal-lying and vertical-lying lengths of trim
2 include means engageable with both lengths at a mitred corner, the means being
3 suitable for holding the lengths of trim together against relative movement in the
4 direction perpendicular relative to the wall.

1 **CLAIM 20.** Apparatus of claim 7, wherein the trim is provided with draft-excluding seals,
2 arranged to contain drafts within the wall.

1 **CLAIM 21.** Assembly of claim 7, wherein the fit of the groove to the spline, after assembly,
2 across the width of the groove, is between zero clearance and 1/4 mm clearance.

1 **CLAIM 22.** Assembly of claim 21, wherein one of either the groove or the spline is tapered,
2 to the extent that the clearance between the groove and the spline, upon presentation
3 of the groove to the spline just prior to assembly is about 1/2 mm.

CLAIM 23. Assembly of claim 7, wherein the groove is less than about 15 mm in width.

1 **CLAIM 24.** Assembly of claim 7, wherein the groove and the spline are plain-sided, in that
2 the sides of the grooves and splines include no protrusions or beads or re-entrant
3 aspects, and in that the fit of the trim to the spline is such that the wood of the trim is
4 not, in substance, required to flex resiliently, upon engagement.

1 **CLAIM 25.** Assembly of claim 7, wherein the distance apart of the side surfaces of the spline
2 is, in substance, not more than the distance apart of the side surfaces of the groove,

3 whereby the fit of the spline to the groove, when assembled, at a particular cross-
4 sectional location thereof, is not an interference fit.

1 **CLAIM 28.** Assembly of claim 16, wherein the corner piece has arms of unequal length, the
2 longer arm having a length of at least 1.5 metres, and the short arm having a length
3 of no more than 40 cm.

1 **CLAIM 27.** Procedure for attaching solid wood door and window trim, baseboard trim, corner
2 moulding, or the like, to a wall, wherein:
3 the procedure includes the step of providing lengths of solid wood trim, and lengths of spline;
4 the procedure includes the step of providing a groove in the trim which is complementary in
5 cross-sectional size and shape to the cross-section of the spline;
6 the procedure includes the step of fixing the spline solidly to the wall by means of fasteners;
7 the procedure includes the step of applying the trim over the spline, whereby the groove in
8 the trim engages the spline;
9 the spline is formed with a pair of opposed, outwardly-facing, side surfaces;
10 the groove is formed with a complementary pair of opposed, inwardly-facing, side surfaces;
11 the spline is formed with a top surface, being a surface of the spline which lies between the
12 side surfaces, and which, when the spline is fixed to the wall, faces away from the
13 wall;
14 the groove is formed with a bottom surface, being a surface of the groove which lies between
15 the side surfaces of the groove,
16 the groove and spline are so dimensioned and arranged that, upon assembly of the groove to
17 the spline, the side surfaces of the spline fit together, and lie in close operational
18 gripping engagement with the side surfaces of the groove;
19 the groove and spline are so dimensioned and arranged that, upon assembly of the groove to
20 the spline, the top surface of the spline and the bottom surface of the groove lie
21 substantially clear of each other;
22 the form of the spline and of the groove in the trim are such that, when the spline is fixed to
23 the wall, and the trim is assembled on the spline, the said opposed side surfaces of
24 the groove and of the trim lie at a substantial angle with respect to the plane of the
25 wall;
26 and the procedure includes the step of so dimensioning the groove and the spline that, upon
27 engagement, the sides of the groove are in contact with the sides of the spline,
28 thereby creating a frictional resistance to the dislodgement of the trim from the spline.

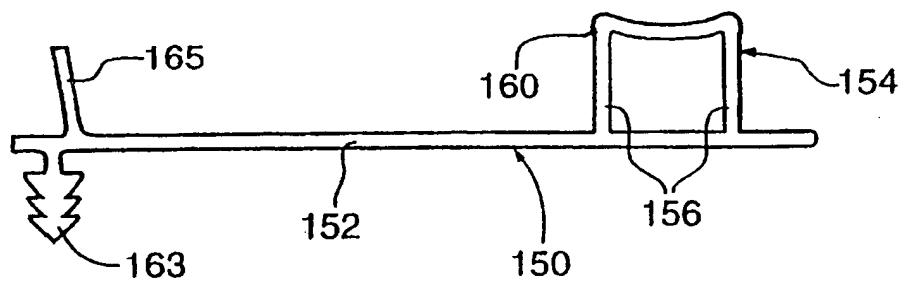


FIG. 1

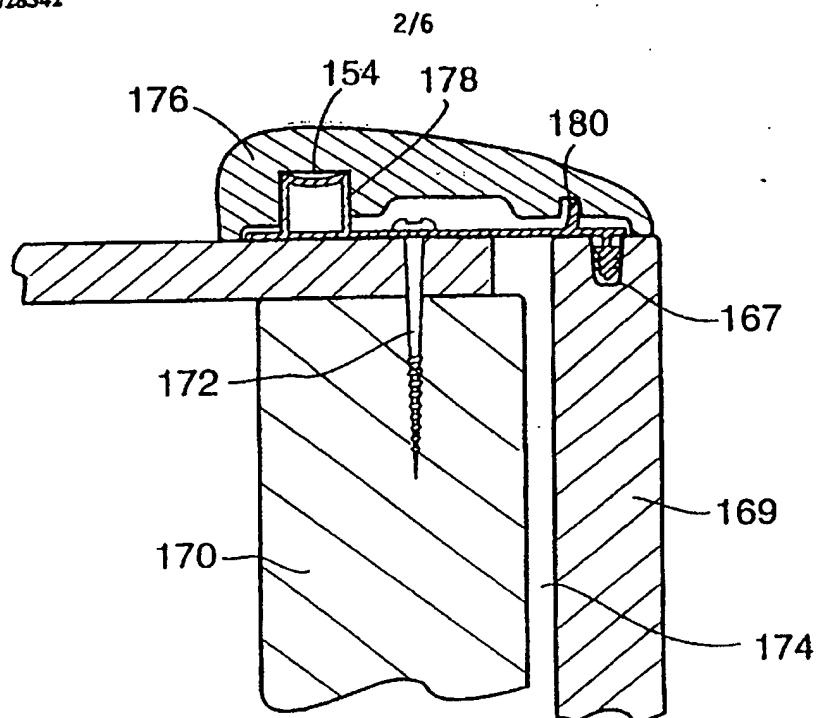


FIG. 2

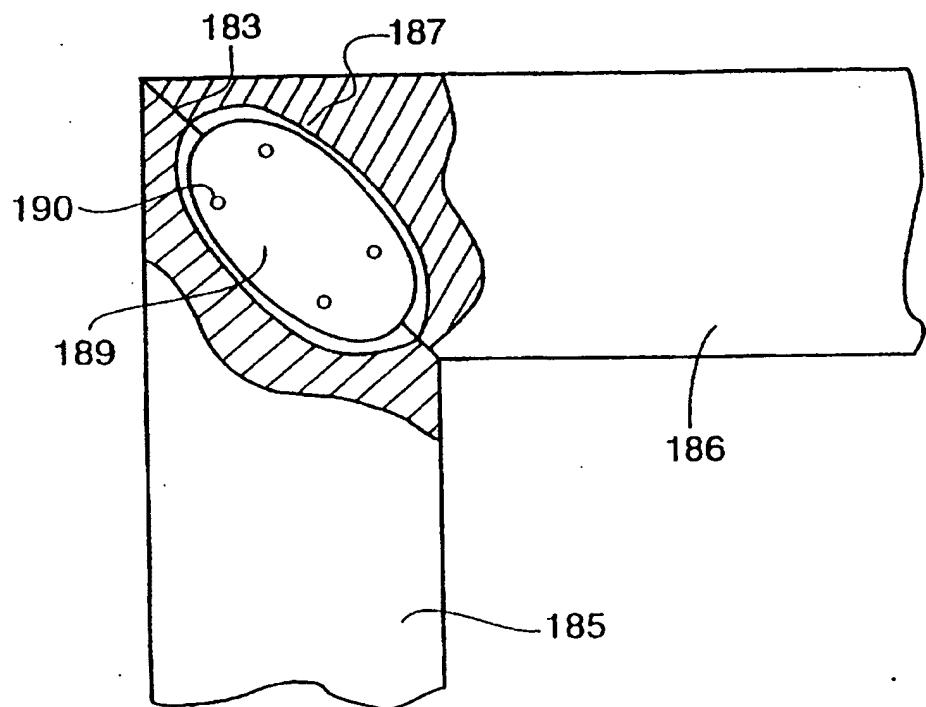


FIG. 3

SUBSTITUTE SHEET (RULE 26)

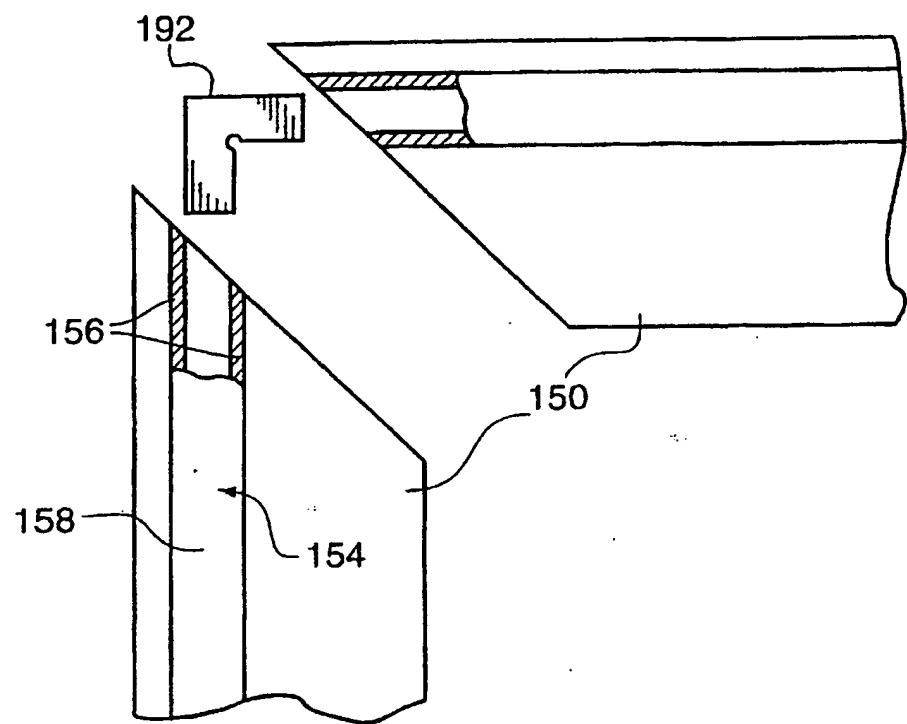


FIG. 4

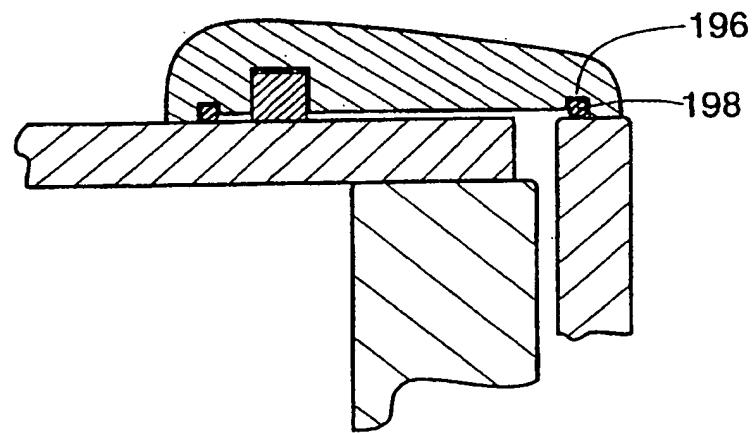


FIG. 5

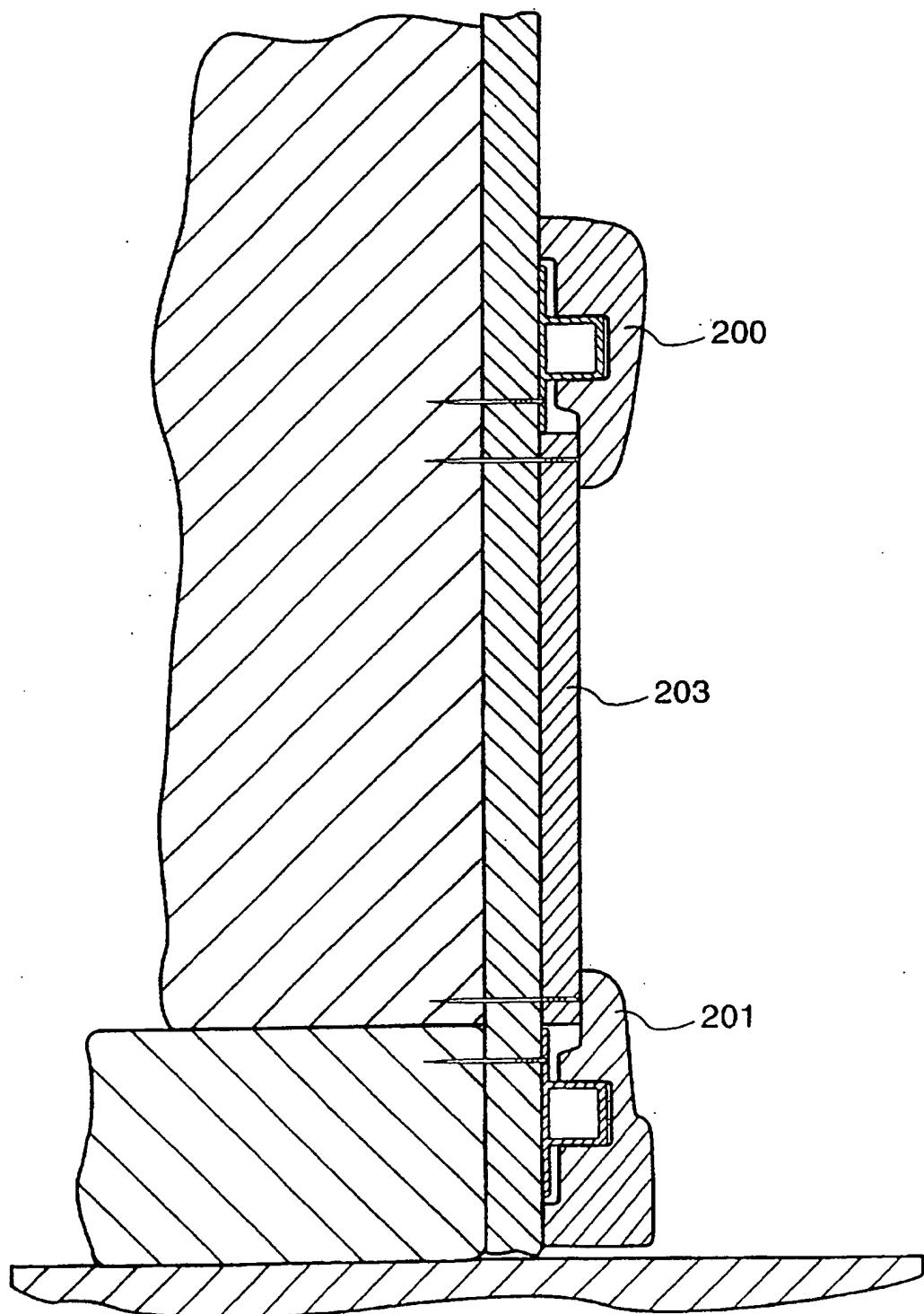


FIG. 6

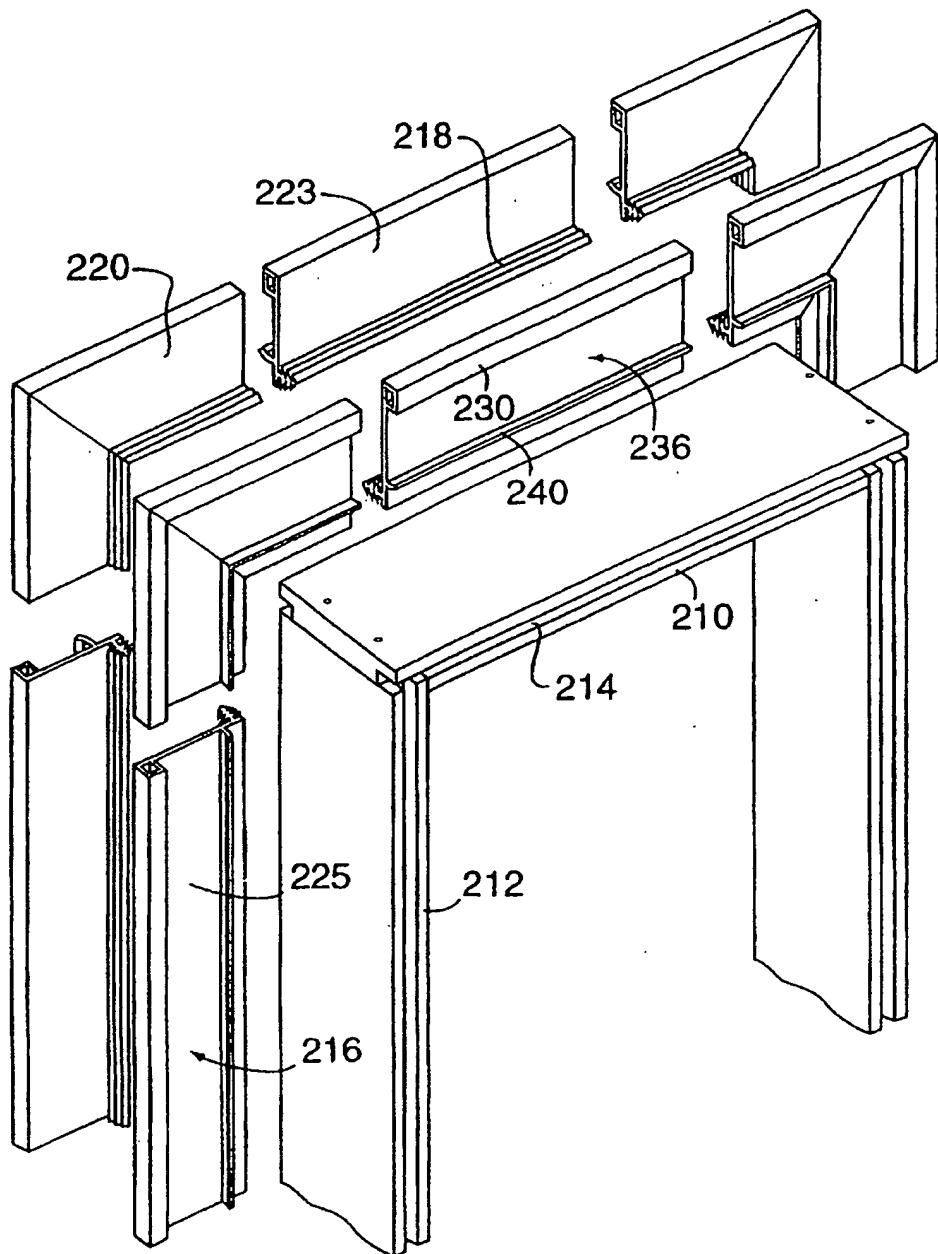


FIG. 7

SUBSTITUTE SHEET (RULE 26)

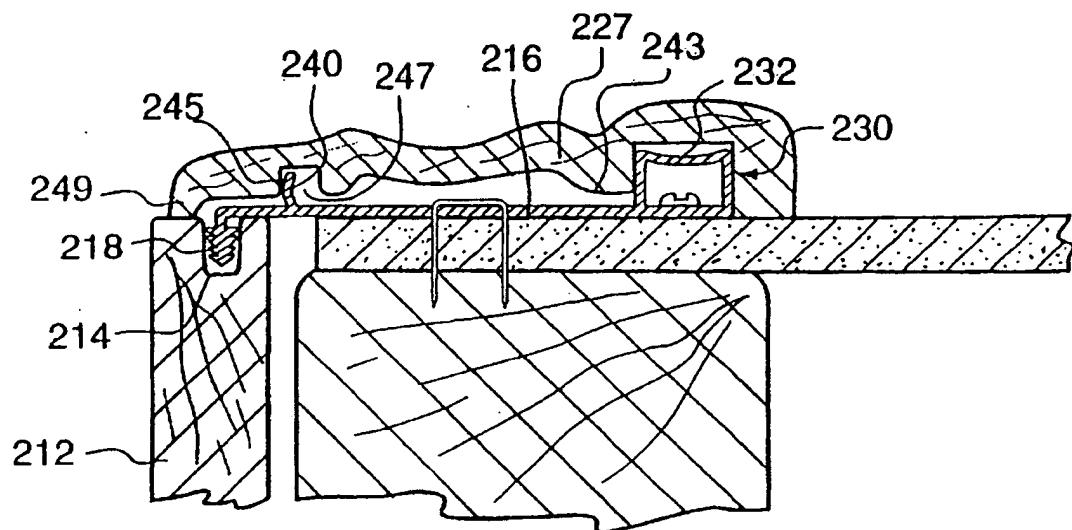


FIG. 8

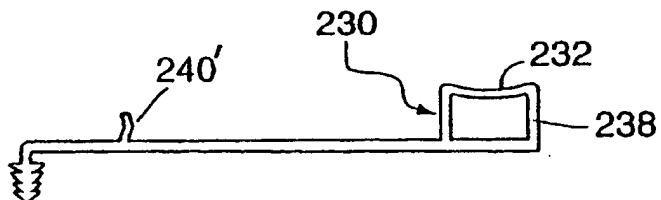


FIG. 9

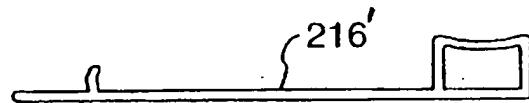


FIG. 10

INTERNATIONAL SEARCH REPORT

International Application No.
PCT/CA 96/00065

A. CLASSIFICATION OF SUBJECT MATTER IPC 6 E06B1/62 E06B1/08 E04F19/02		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) IPC 6 E04F E06B		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practical, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP,A,0 377 780 (HOFSTETTER) 18 July 1990	1,7,24, 25,27
Y	see column 3, line 32 - column 7, line 38; figures	21-23
Y	WO,A,93 19273 (ASQUITH) 30 September 1993 cited in the application	21-23
A	see claims 1-8,15,16,19,20,23; figures 1-3	1,7,27
A	GB,A,2 239 281 (YOUNG) 26 June 1991 see page 5, line 8 - page 7, line 25; figure	1,7,14, 18,27
A	US,A,5 179 811 (WALKER) 19 January 1993 see column 4, line 62 - column 5, line 28; figures 4-6	1,3,7,27
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<input checked="" type="checkbox"/> Further documents are listed in the continuation of box C.		<input checked="" type="checkbox"/> Patent family members are listed in annex.
* Special categories of cited documents : 'A' document defining the general state of the art which is not considered to be of particular relevance 'E' earlier document but published on or after the international filing date 'L' document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) 'O' document referring to an oral disclosure, use, exhibition or other means 'P' document published prior to the international filing date but later than the priority date claimed		
1 Date of the actual completion of the international search		Date of mailing of the international search report
1 October 1996		16 October 1996 (16.10.96)
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+ 31-70) 340-2040, Tx. 31 651 cpo nl, Fax (+ 31-70) 340-3016		Authorized officer Depoorter, F

INTERNATIONAL SEARCH REPORT

International Application No.
PCT/CA 96/00065

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE,A,25 57 057 (BETTERMANN) 30 June 1977 see page 7, paragraph 7 - page 10, paragraph 2; figures ---	1,3,4,7, 8,10
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A	US,A,4 642 957 (EDWARDS) 17 February 1987 ---	
A	WO,A,92 01847 (VILLA) 6 February 1992 -----	

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Information on patent family members

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FR-A-1376369	08-02-65	NONE		
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